TC 9187-05
LETTER REPORT
SEPTEMBER, 1994

SUBSURFACE SOIL INVESTIGATION AT UNDERGROUND STORATE TANK IN BUILDING 2 C6 TORRANCE FACILITY DOUGLAS AIRCRAFT COMPANY

PREPARED FOR

McDONNELL DOUGLAS CORPORATION
DOUGLAS AIRCRAFT COMPANY

PREPARED BY
TETRA TECH, INC.
PASADENA, CALIFORNIA

TETRA TECH, INC.
630 N.Rosemead Blvd.
Pasadena, CA 91107
Tel. (818)449-6400
Fax (818)351-8126

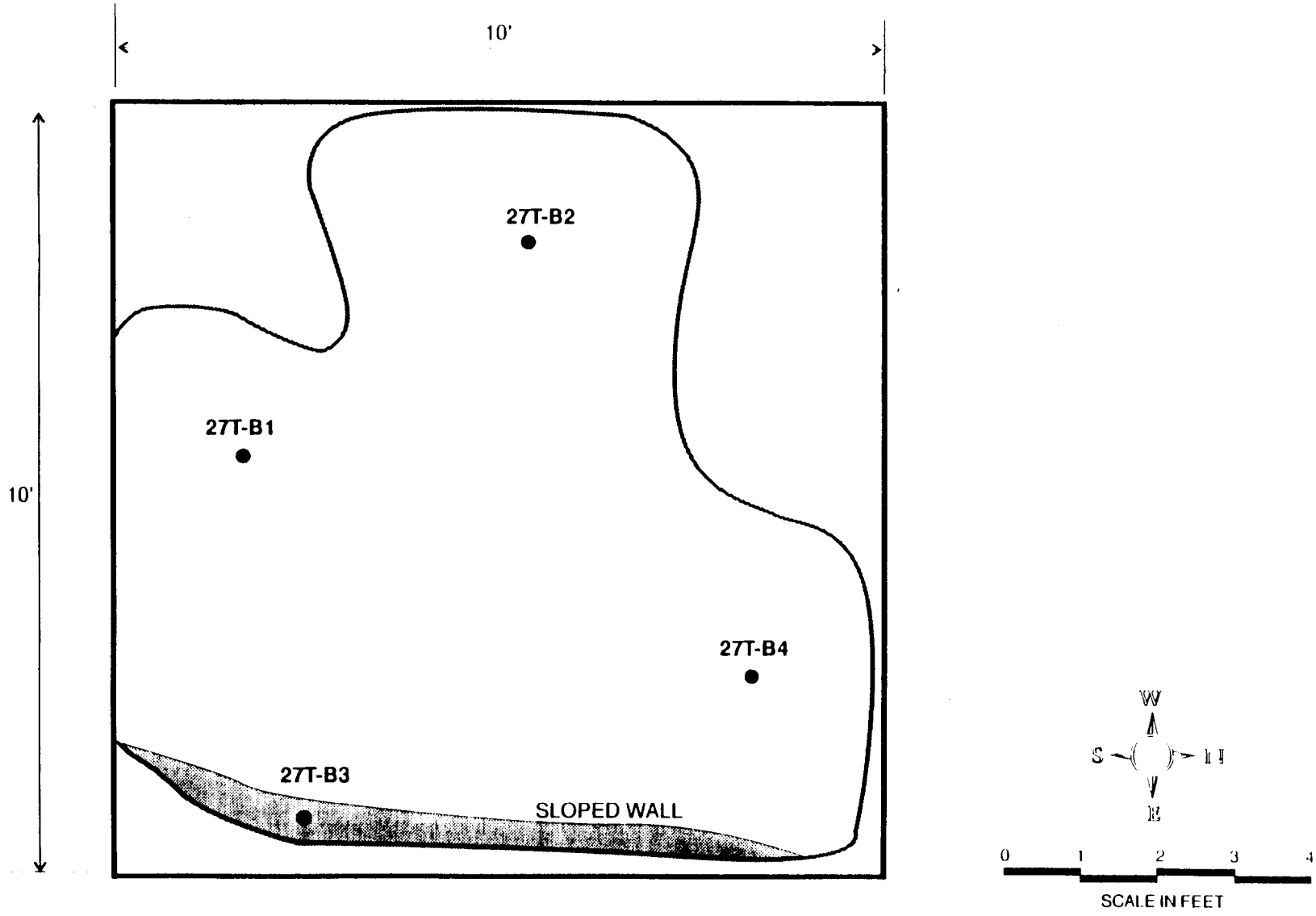

FIGURE 1 SOIL BORING LOCATIONS FOR PIT NO. 27T

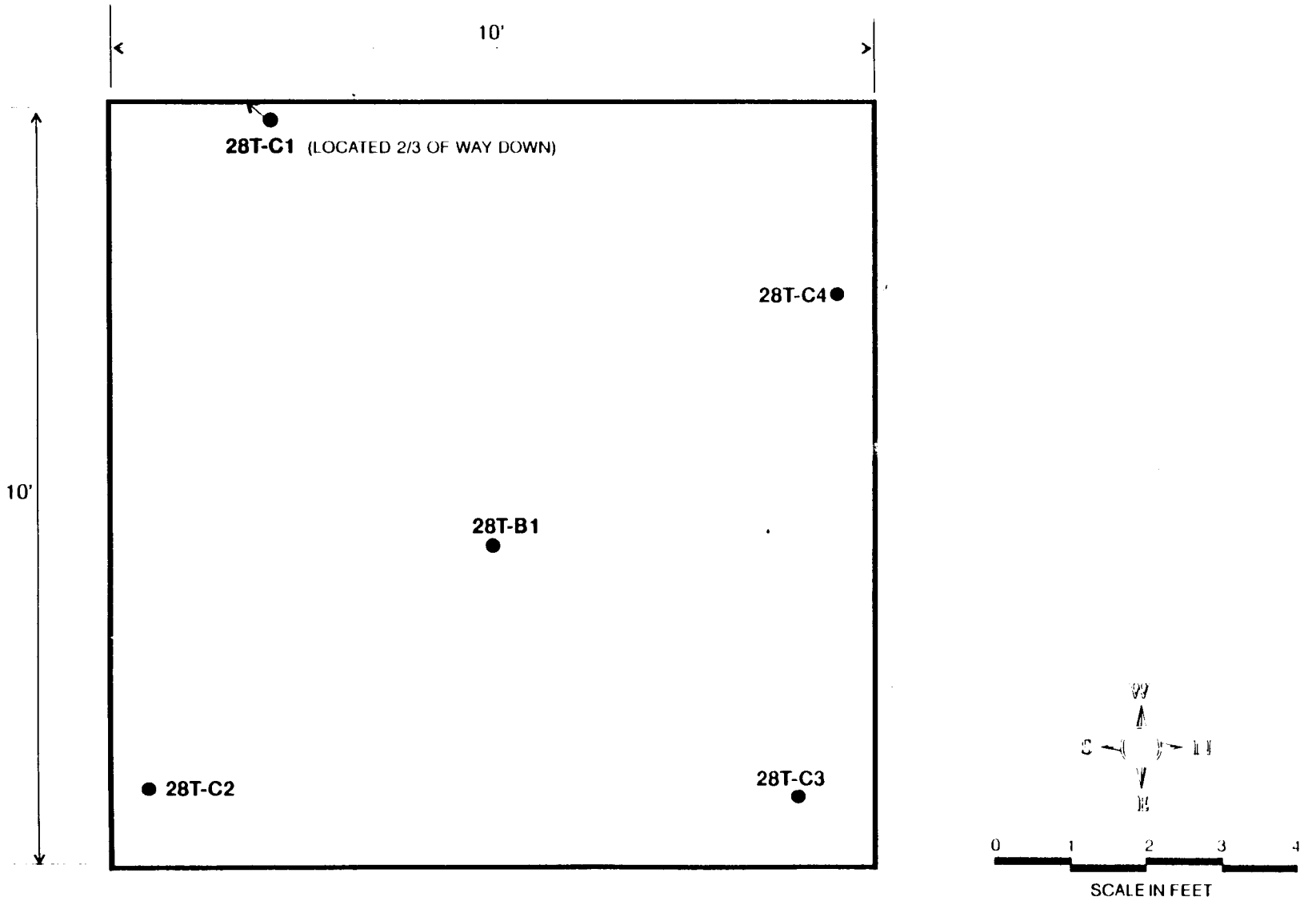

FIGURE 2 SOIL BORING LOCATIONS FOR PIT NO. 28T

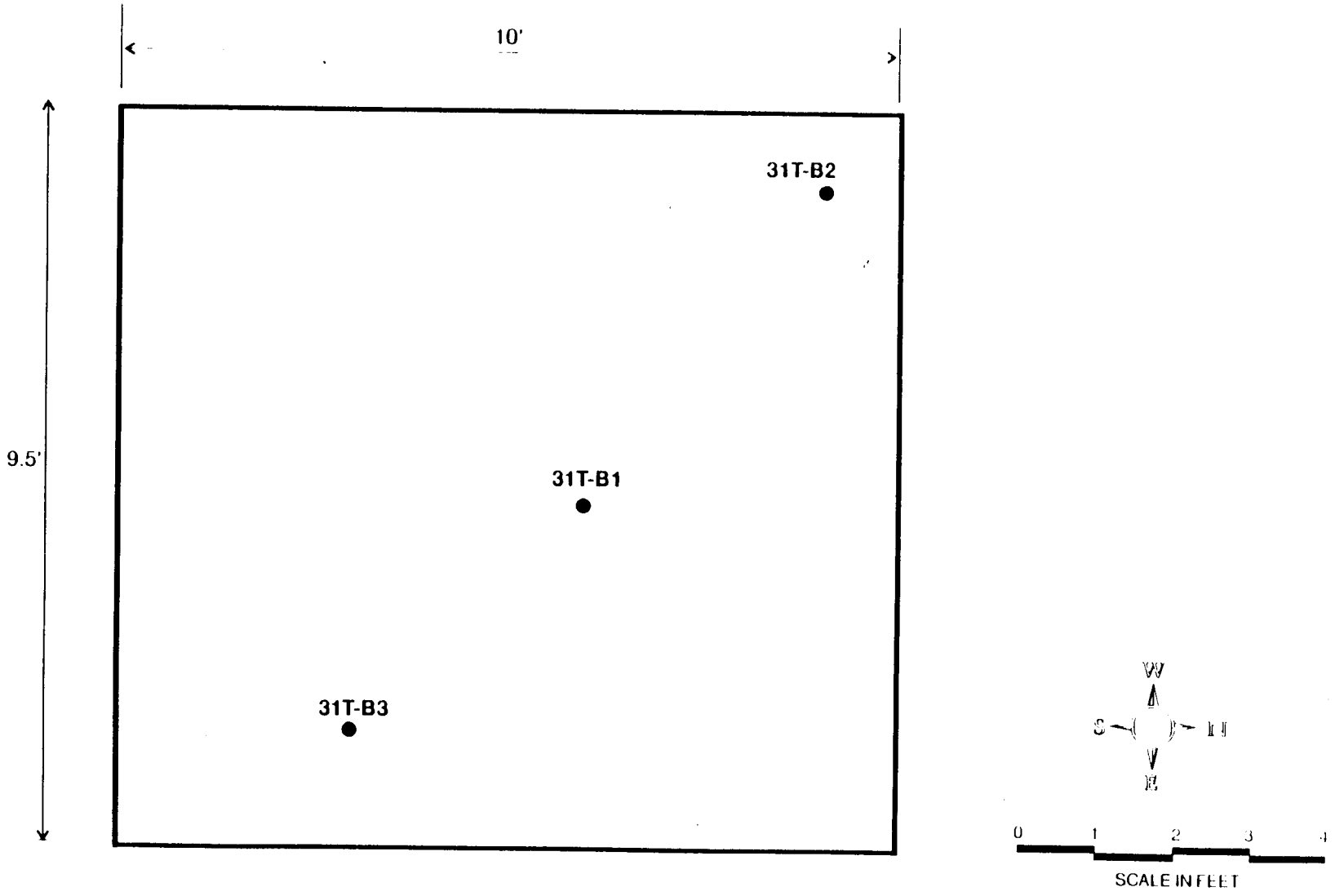

FIGURE 3 SOIL BORING LOCATIONS FOR PIT NO. 31T

Table 1 - Sample Locations

Pit No.	Sample I.D.	Sample Location
27	27T-B1	Bottom - Adjacent to Southern Wall
	27T-B2	Bottom - Adjacent to Western Wall
	27T-B3	Close to Bottom - On Sloping Eastern Wall
	27T-B4	Bottom - Adjacent to Northeastern Corner
28	28T-B1	Bottom - Located at Center of Pit
	28T-C1	Near Center Wall - Located 2/3 of Way Down adjacent to Southwestern Corner
	28T-C2	Bottom - At Southeastern Corner
	28T-C3	Bottom - At Northeastern Corner
	28T-C4	Bottom - Adjacent to Northern Wall
31	31T-B1	Bottom - Located near Center of Pit
	31T-B2	Bottom - Adjacent to Northwestern Corner
	31T-B3	Bottom - Located near Eastern Wall

Note: Appendix D contains photographs of each subject UST excavation.

Table 2 - Laboratory Results

Pit No.	Sample I.D.	CHARACTERISTICS OF CHEMICAL COMPOUNDS IN mg/kg OR ppm						
		TPH (Gasoline)	Benzene	Ethylbenzene	Toluene	o-Xylene	m-Xylene/p-xylene	BTXE, Total
27	27T-B1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	27T-B2	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	27T-B3	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	27T-B4	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
28	28T-B1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	28T-C1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	28T-C2	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	28T-C3	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	28T-C4	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
31	31T-B1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	31T-B2	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	31T-B3	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

Note N.D. is defined as non-detected

Attachment A

Health and Safety Plan

TETRA TECH, INC.
670 N. Rosemead Blvd.
Pasadena, California 91107
Telephone (818) 449-6400
FAX (818) 351-5291

September 23, 1994

Mr. Scott Lattimore
Environmental Engineer
Safety, Health, and Environmental Affairs
McDonnell Douglas
3855 Lakewood Boulevard (9-20)
Long Beach, CA 90846-0001

Subject: **REPORT OF A SUBSURFACE SOIL INVESTIGATION AT UNDERGROUND STORAGE TANK EXCAVATIONS IN BUILDING 2 OF DAC C6 TORRANCE, CA FACILITY**

Dear Scott:

This letter report describes the field activities and findings of a subsurface soil assessment at three underground storage tank excavations in Building 2 of the Douglas Aircraft Company (DAC) Torrance facility. The investigation was performed by Tetra Tech on August 25, 1994, under a blanket contract agreement GMA-3485-C with the Douglas Aircraft Company.

Site Location and History

The subject sites of this investigation are three underground storage tank excavations situated at various locations throughout Building 2 of the DAC Torrance facility. Twelve emergency generator underground storage tanks (USTs) containing gasoline and diesel fuel were removed in September of 1987 by Crosby & Overton, Inc. Some samples from the excavations revealed elevated concentrations of TPH and BTEX; and therefore, further excavation was conducted. Upon further excavation and investigation, it was found that three excavations within Building 2 contained soils with high concentrations of TPH after all feasible limits of the excavation had been reached.

After removal of the tanks, Crosby & Overton performed an investigation that led to a recommendation that hydrocarbon impacted soil be left in place at the subject sites, Tank Pits 27T, 28T, and 31T. This action was considered justifiable since site specific conditions (e.g., poorly permeable, fine grained soils underlying the site, space constraints, etc.) were deemed to preclude any successful treatment of hydrocarbon impacted soils. Therefore, based on this initial investigation, Tank Pits 27T, 28T, and 31T were left in their excavated state.

Project Objective

The objective of this investigation was to determine the existence and concentrations of hydrocarbon constituents in subsurface soil at the bottom of three UST excavations so that appropriate measures would be taken to mitigate any environmental problems associated with them. This investigation was initiated to ensure that no detectable contamination would be present prior to the performance of backfill operations.

Health and Safety Issues

The subject excavation pits have the following dimensions: (1) Tank 27T is 10.0' (W) x 10.0' (L) x 17.0' (D), (2) Tank 28T is 10.0' (W) x 10.0' (L) x 17.0' (D), and (3) Tank 31T is 10.0' (W) x 10.0' (L) x 10.0' (D). According to applicable occupational health and safety regulations, working in tanks, pits, and vaults constitutes confined space entry. Therefore, pre-entry conditions were defined by the Tetra Tech Corporate Health and Safety Officer and included: (1) a dry working area without any liquids, (2) a safe working environment with sufficient oxygen (>19%) and the absence of any harmful gases (petroleum hydrocarbons and other organic vapors), (3) no welding or burning activities within the site area, and (4) a buddy system and monitoring program during the entire field operation. If any of the above conditions were not met, the field personnel would either have to upgrade the personal protective equipment (PPE) to level C, or make other arrangements for sample collection. Attachment A contains a copy of the health and safety plan for this project.

Field Investigation

Tetra Tech conducted the subsurface soil assessment on August 25, 1994. The investigation procedures are described below:

1. Tetra Tech's field personnel met with Mr. Lattimore, DAC Environmental Engineer, prior to initiating the field work. A brief tour of all subject sites was conducted prior to the actual investigation. All of the Tetra Tech field personnel had received OSHA 40-hour health and safety training, CPR training, and OSHA 8-hour hazardous waste site supervisor training.

2. Tetra Tech's field health and safety officer used a Photovac Microtip photoionization detector and a Foxboro OVA-128 ionization detector to determine

the presence of petroleum hydrocarbons and volatile organic vapor around the perimeter of the excavations. Neither hydrocarbon nor volatile organic vapors were detected around the perimeter of the excavations.

3. Field personnel with level D PPE then entered the perimeter of the excavation areas. The sampling locations were selected next to suspected hydrocarbon impacted areas located on the bottom and sidewalls of each excavation. The sampling locations for each excavation are presented for Tank Pits 27T, 28T, and 31T in Figures 1, 2, and 3, respectively. The sample locations for each excavation are presented in Table 1.

4. Upon exposing the subsurface soil, the field team used a hand auger to drill each borehole. Several undisturbed soil samples (ranging from 3 to 5 per excavation) were collected at a depth of 1 foot underneath the surface using a sledge hammer sampler. The soil samples were collected in 1 inch by 6 inch brass liners. Attachment B shows the sampling techniques and quality assurance measures utilized for this project.

5. The soil samples were then delivered to Applied P&Ch Laboratory (APCL), a Pomona-based state-certified analytical laboratory, for the following chemical tests: total petroleum hydrocarbons (EPA method M8015) and volatile organics (EPA method 8020).

Results and Interpretation of Chemical Analyses

Twelve soil samples were analyzed by APCL for total petroleum hydrocarbons and volatile organics. The test results are shown in Table 2 and the analytical report is presented in Attachment C.

The results of the chemical analyses show that no detectable levels of hydrocarbons were found in any of the locations sampled. Therefore, the subject sites may be considered clean.

Conclusions and Recommendations

As laboratory results have indicated, no detectable levels of hydrocarbons were found to be present in any of the tank pits currently under investigation. From this, it is the conclusion of this investigation that the suspected impacted sites are considered to be clean. Therefore, we recommend that Douglas Aircraft Company may safely backfill the three excavated sites, with no future action required.

Should you have any questions concerning this letter report, please feel free to contact me at (818) 449-6400, ext. 214 .

Sincerely,

Albert F. Yuen, P.E., R.E.A.
Senior Project Manager

August 1994
TC #9187-05

HEALTH & SAFETY PLAN

DOUGLAS AIRCRAFT COMPANY
C6 TORRANCE FACILITY

Prepared for:

Safety, Health, and Environmental Affairs
Douglas Aircraft Company
3855 Lakewood Boulevard
Long Beach, California 90846

Prepared by:

Tetra Tech, Inc.
670 North Rosemead Boulevard
Pasadena, California 91107

TETRA TECH SITE SAFETY AND HEALTH PLAN

Site Name: Douglas Aircraft Company's C6 Torrance Facility
Torrance, California

Project Number TC - 9187-05

Original Site Safety Plan: Yes (X) No ( )

Plan Prepared by Nisha Patel Date August 23, 1994

Nisha Patel
Project Health & Safety Officer

Plan Approved by _____ Date August 23, 1994

David Liu, Ph.D.
Project Manager

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ATTACHMENT

LIST OF FIGURES

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EMERGENCY PHONE NUMBERS

Person	Title	Phone #
David Liu	Project Manager	(818) 449-6400
	Fire	911
	Police	911
	Ambulance	911
	Poison control center	(800) 441-0040
Dr. White	Medical advisor	(818) 355-3435
Scott Lattimore	Client Contact	(310) 593-3902
	U.S. EPA-Emergency Response Team	(201) 321-6660
	Chemtrec	(800) 424-9300
	Centers for Disease Control (day)	(404) 329-3311
	(night)	(404) 329-2888
	National Response Center	(800) 424-8802
	Superfund/RCRA Hotline	(800) 424-9346
	TSCA Hotline	(800) 424-9065
	National Pesticide Information Service	(800) 845-7633
	Bureau of Alcohol, Tobacco, and Firearms	(800) 424-9555
	Harbor-UCLA Medical Center	(310) 222-2345

Directions to nearest hospital:

Proceed south on Normandie Avenue to W. Carson Street. Turn left on W. Carson Street to Harbor-UCLA Medical Center at 1000 W. Carson Street in Torrance (see Figure 1).

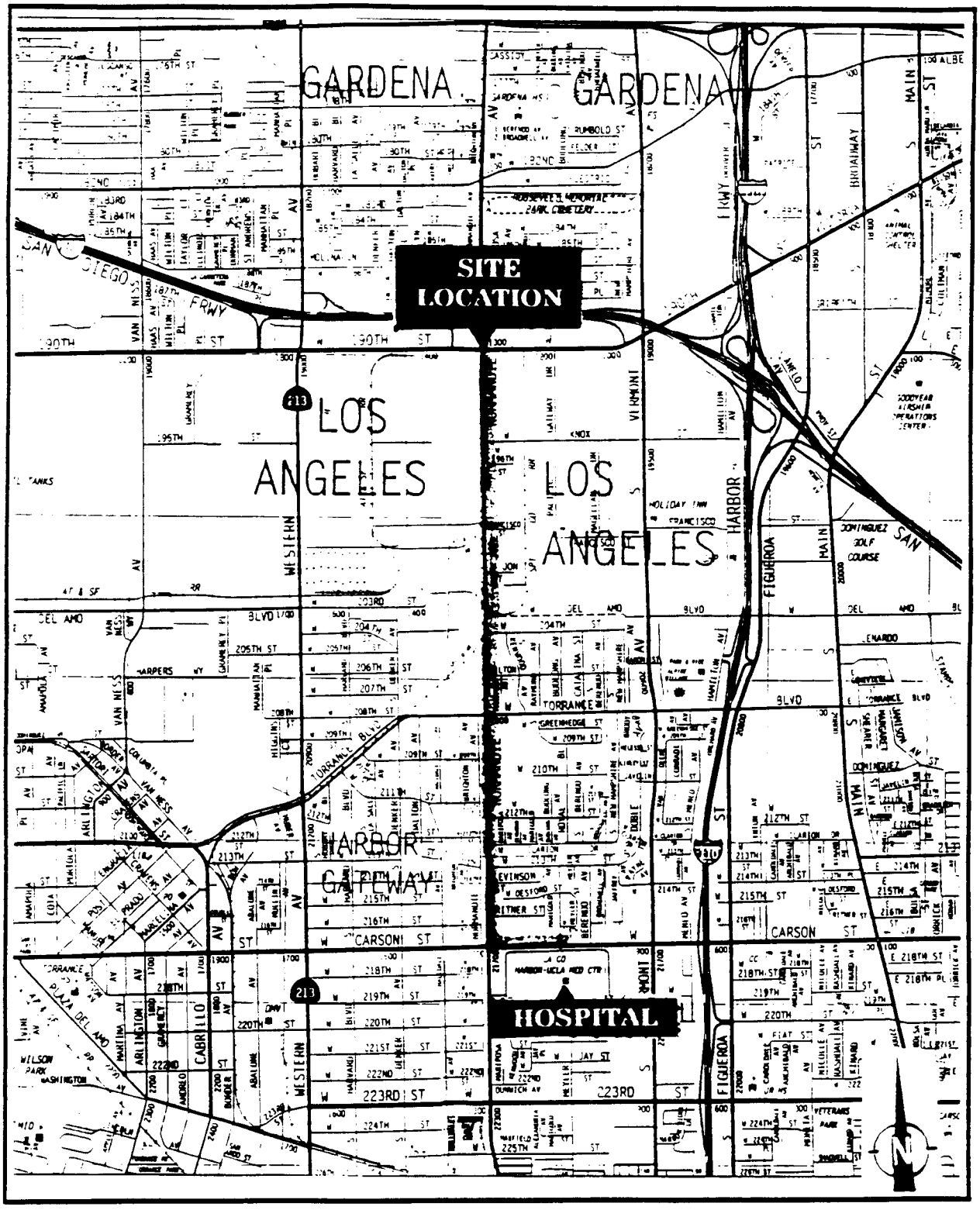

FIGURE 1 ROUTE TO HOSPITAL

1.0 FACILITY BACKGROUND

1.1 Site Description

Type: Spill ( ) Fire ( ) HW Site ( ) Industrial Facility (X)

Other:

The site consists of three underground storage tank (UST) excavations.

Location:

The Douglas Aircraft Company's C6 Torrance Facility Coast Guard is located at W. 190th Street and Normandie Avenue in the City of Torrance.

Physical Description:.

The UST excavations are located within Building 2. Each excavation is 10 feet by 10 feet and varies in depth from 10 to 15 feet.

History:

In September 1987, twelve former emergency generator underground storage tanks containing gasoline and diesel fuel were removed. Some samples showed elevated concentrations of TPH and BTEX; therefore, further excavation was conducted. Upon further excavation and investigation, it was found that three excavations within Building 2 still contained soils with high concentrations of TPH after all feasible limits of the excavation had been reached.

Status:

Active ( ) Inactive (X)

Surrounding Population:

The immediate area is primarily for industrial/commercial use.

Topography:

The site is relatively level.

Site Plan/Sketch completed (next page):

Yes ( ) No (X)

1.2 Goals

This Health and Safety Plan is prepared to address the worker's health and safety issues for the following field operations to be conducted at the C6 Torrance Facility:

Hand Augering and Sampling Operations:

- A total of twelve soil samples will be taken by hand augering sampler from the three excavation pits. Generally, samples will be taken at the bottom of the pits and near the side walls.

2.0 OVERALL HAZARD EVALUATION

Hazard Level: High ( ) Moderate ( ) Low (X) Unknown ( )

Hazard Type: Liquid ( ) Solid (X) Sludge ( ) Vapor/Gas (X)

Known or suspected hazardous materials present on-site:

(1) Gasoline

Characteristics of hazardous material included above:

Petroleum Hydrocarbons

This class of compounds causes irritation of the upper respiratory tract, and nervous system effects ranging from dizziness and headache to coma and respiratory arrest if inhaled in large quantities. Ingestion causes throat, lung and stomach irritation. Skin exposure causes a burning sensation.

Volatile Organics (BTEX)

Benzene can cause liver and kidney damage. It can also affect the bone marrow resulting in blood cell changes. Exposure to high levels of benzene may lead to central nervous system depression, unconsciousness, or fatal cardiac arrhythmia. Major toxic effect is hematpoietic toxicity (affects blood formation). Chronic exposure to low levels of benzene has also been linked with leukemia, aplastic anemia. **Benzene has been identified as a carcinogen.**

Toluene can cause respiratory irritation and central nervous effects following inhalation exposure. Reported effects for low level exposure include: drowsiness, ataxia, visual impairment, and headache. Chronic exposure may also result in neurobehavioral effects including poor concentration and test performance. Toluene is a mutagen and has been associated with congenital human defects. It is not a carcinogen.

Ethylbenzene is an irritant to eyes, mucous membranes, and skin. It can cause central nervous system depression and dizziness. Liver and kidney toxicity have been linked to chronic exposures to ethylbenzene. Ethylbenzene is not classified as a human carcinogen or mutagen.

Xylenes can cause cyanosis of extremities, gastrointestinal effects, and neurological effects. Short-term effects following low-level inhalation include dizziness and nose and throat irritation. Chronic exposure can result in labored breathing, increased heart palpitation, severe chest pain and abnormal ECG. Xylenes are not classified as either a carcinogen or mutagen.

Additional Hazards On-Site:

Physical hazards include slips, trips, and falls in the excavation pits and around the job site.

2.1 Hazard Assessment Summary

Due to the nature of the site, the hazard from chemical exposure is considered to be minimal. The principal hazard for this project will be accidents involving trauma type injuries.

3.0 KEY PERSONNEL AND RESPONSIBILITIES

3.1 PROJECT MANAGER:

Project Manager, David Liu directs project activities.

3.2 SITE HEALTH and SAFETY OFFICER (SSHO):

The SSHO, Nisha Patel will be responsible for field implementation of the Site Safety and Health Plan (SSHP). Responsibilities include:

- Enforcing the SSHP;
- Stopping work as required to ensure personal safety and protection of property, or when noncompliance with safety requirements is found;
- Determining routes to emergency medical facilities, providing telephone numbers (including poison control centers), and arranging for emergency transportation to medical facilities;
- Entering the exclusion zone in emergencies, if appropriate, when at least one other member of the field team is available to stay behind and notify emergency services (or after emergency services have been notified);
- Examine work party members for symptoms of exposure or stress; and
- Ensuring that each team member has been given the proper medical clearance by a qualified medical consultant, and monitor all team members to determine compliance with the applicable physical requirements as stipulated in the SSHP.

3.3 SUBCONTRACTORS

Subcontractors and other personnel on the site will be responsible for understanding and complying with all requirements in this document. SSHP requirements will be included in subcontracts. The written requirements will be copied and distributed to personnel working on the site, and individuals receiving the written requirements will be required to sign off as having received and reviewed the document.

4.0 TRAINING

4.1 All Site Personnel

All personnel subject to exposure to contaminants shall be trained in accordance with 29 CFR 1910.120 and 8 CCR 5192. Employees performing intrusive field work such as excavation and soil sampling will have received a minimum of 40 hours of classroom training and a minimum of 3 days actual field experience under the direct supervision of a trained, experienced supervisor (8CCR 5192 (e) (3)(A).

4.2 Refresher Training

Personnel engaged in field activities that are subject to the training described in Section 4.1 above shall receive 8 hours of refresher training annually (8 CCR 5192 (e)(8)).

4.3 Pre-Entry Briefings and Informational Materials

The following training sessions and informational materials will be provided on the site:

- Tailgate Safety Meetings - A tailgate safety meeting will be conducted at the beginning of each shift or work day by the SSHO. The H & S considerations for the day's activities will be discussed and the necessary protective equipment outlined.

- Site Safety and Health Plan - All workers at the site shall be informed of the contents of the SSHP. Signing the daily tailgate form is an acknowledgment of the worker that he/she understands the SSHP.

5.0 MEDICAL SURVEILLANCE

5.1 Physical Examination

As required by Tetra Tech, all Tetra Tech personnel will have successfully completed a replacement or periodic/update physical examination. This will comply with OSHA 1910.120 and 8 CCR 5192 (f) requirements for hazardous waste site operations.

The Tetra Tech medical surveillance program examination consists of:

- An occupational and general physical history;
- Complete physical examination which incorporates the head, torso, abdomen, limbs, and musculo-skeletal system;
- Chest X-ray, which may be waived in the judgment of a physician;
- Pulmonary function test;
- Audiometric exam;
- Laboratory testing of blood and urine;
- Vision test; and
- Electrocardiogram.

The following information is provided to the examining physician:

- Description of employee's duties;
- Anticipated exposure levels;
- Description of the personal protective equipment to be used; and
- Information from the previous medical exams.

A copy of the medical examination is provided to the employee at his/her request. The employee will be informed of any medical conditions that would result in work restrictions the would preclude him/her from working at hazardous waste sites.

Subcontractor personnel who have the potential for exposure to hazardous materials will have successfully completed an examination equivalent to Tetra Tech's. All physicals will be approved by a physician who is Board Certified in Occupational Medicine.

5.2 Medical Records

Medical and personnel exposure monitoring records will be maintained in accordance with the requirements of 29 CFR 1910.120 and 8 CCR 5192 and will be kept for 30 years.

5.3 Injury and Illness Treatment

If an injury/illness is the result of a chemical exposure the SSHO and/or the PM will promptly initiate the steps necessary to identify the chemical(s). Chemical identification will be accomplished through use of monitoring equipment and any prior sampling results that are available. Such information will be made available to treating physician and the PM.

Any injury/illness not limited to a first-aid response will require the SSHO to immediately notify the PM. This notification allows the coordination of resources to assist the responding parties and the treating physician in rendering appropriate care.

Any employee of Tetra Tech or of a subcontractor who is suspected of having an overexposure to the chemicals on the site will be given another complete physical examination. Any employee or contractor who develops a lost-time illness or sustains a lost-time injury will be re-examined. the physician will certify that the employee is fit to return to work by completing a "Return to Work Authorization Following Medical absence Form."

5.4 Heat Stress Monitoring

- To aid in the prevention of heat stress, the following will be provided for personnel working at the site, if required:

  Potable Water
  - Fresh Water
  - Potable water with 1% salt or commercial mix (such as Gatorade) will be within easy access to all workers

  Work Schedules
  - Work/rest regimens will be developed on recommendations by the Health & Safety Officer. The initial work schedule will consist of a 55-minute work regime followed by a 5-minute rest period. This work schedule will be modified as is necessary to conform with the heat stress monitoring criteria outlined below.

Personnel will be instructed to look for the following initial symptoms of heat stress:

- Heat Exhaustion:
  - pale, clammy skin
  - profuse perspiration
  - tiredness, weakness
  - headache, perhaps cramps
  - nausea, dizziness (possible vomiting)
  - possible fainting
- Heat Cramps:
  - cramping of muscles in legs and abdomen

- Heat Stroke:
  - high body temperature
  - skin is characteristically hot, red, and dry (the sweating mechanism is blocked).

Heat stress monitoring will commence when the ambient temperature reaches 70 Degrees Fahrenheit if Tyvek or Saranex (level C) garments are in use. Otherwise, heat stress monitoring will commence at an ambient temperature of 85 degrees Fahrenheit. The monitoring will consist of the following:

- Heart rate (HR) will be measured by the radial pulse during 30 seconds as early as possible in the resting period. The heart rate at the beginning of the rest period should not exceed 110 beats per minute. If the HR is in excess of the above value, the next work period will be shortened by 33% while the length of the rest period stays the same. If the pulse rate is in excess of 110 beats per minute at the beginning of the next rest period, the following work cycle will be further shortened by 33%.

- Workers will be asked to report any dizziness, faintness, cramps, or other symptoms of heat stress as discussed above.

- Workers will also be questioned about any history of asthma, or if currently taking asthma medications. Persons taking asthma medications are typically more susceptible to heat stress reactions.

First aid for heat stress will include the following:

- Heat Stress
  - exposed person will be removed from the work zone and placed in shade.
  - person will be required to rest in a recumbent position.
  - fluids will be administered (Gatorade).
  - workload will be reduced to a level which will prevent heat stress symptoms from recurring.

- Heat Cramps and Heat Exhaustion
  - same first aid procedures as described above except that exposed person will be requested to leave the site for the remainder of the day.
- Heat Stroke
  - same person will be placed in a shaded area and medical attention (Paramedics) will be sought immediately.

6.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

6.1 Rationale for Selection of PPE

All site workers shall wear, at a minimum, coveralls or tyveks, steel-toed shoes or boots, safety glasses, hard hats, and hearing protection (Level D ensemble). In the event of high petroleum hydrocarbon exposure, those site personnel present, shall upgrade to level C PPE.

6.2 Equipment

Level of Protection: Level D
Respiratory Protection: None
If Air-Purifying: None
Canister/Cartridge Type: N/A
Protective Clothing:

Suit Type: Coverall or Tyvek*	Boot Type: Steel Toed
Glove Type(s): Neoprene+	Head Protection: Type Hard Hat
Eye Protection Type: Glasses/Goggles	Other Protective Clothing: N/A
Hearing Protection: Muff Type/Foam Inserts	

Level of Protection: Level C
Respiratory Protection: Yes
If Air-Purifying: Half-Face or Full-Face w/ Cartridge
Canister/Cartridge Type: North N7500-83 or equivalent
Protective Clothing:

Suite Type: Tyvek*	Boot Type: Steel Toe
Glove Type: Neoprene+	Head Protection: Hard Hat
Eye Protection Type: Glasses/Goggles	Other Protective Clothing: N/A
Hearing Protection: Muff Type or Foam Inserts	

** if high splash situation exists, upgrade to Saranek or equivalent liquid-resistant suit.*
+ persons handling soils or water samples will be required to wear neoprene inner gloves.

7.0 WORK ZONES AND SECURITY MEASURES

The following general work zone and security guidelines will be implemented:

(1) Visitors will not enter the work zone unless they have attended a project safety briefing.

(2) Visitors who do not have business related to the project will be excluded from the site.

(3) No sampling operation shall be left unattended.

The work zone for this site shall consist of the area within 10 feet of an open excavation. No equipment other than that needed to sample soils should be placed in this area. Persons outside this area should place their equipment and themselves upwind of any activities, or open excavations. Persons outside the work zone will be considered in the support/decontamination zone and are not required to comply with the respiratory protection requirements inside the work zone unless vapor levels outside the work zone exceed the action levels.

8.0 AIR MONITORING PLAN

Air monitoring will be conducted around the perimeter of the excavations

8.1 Air Monitoring Equipment

(1) A Foxboro OVA-128 ionization detector utilized to monitor total petroleum hydrocarbons, zeroed with hydrocarbon-free air and calibrated with methane.

(2) A Photovac Microtip photoionization detector, utilized to monitor volatile organic compounds, zeroed with hydrocarbon-free air and calibrated with isobutylene.

8.2 Action Levels

Action levels for upgrade and downgrade of respiratory personal protective equipment (PPE):

Table 1

Condition	Level of PPE
Workers in support zone	Level D
Workers in work zone	Level D
Workers in work zone with breathing zone OVA readings >50 ppm of background	Level C
Workers in work zone with breathing zone OVA readings > 1000 ppm of background	Withdraw from the site and notify Fire Department to mitigate the problems before continuing operations

Rationale for upgrade/downgrade matrix:

The decision to upgrade to Level C protection at 50 ppm OVA readings is based on the SCAQMD (South Coast Air Quality Management District) Rule 1166 monitoring criteria for VOCs, although PEL for gasoline vapors is at 300 ppm according to CCR Title 8, General Industry Safety Orders.

9.0 DECONTAMINATION PROCEDURES

Hand Augering and sampling equipment and tools contaminated by site soils will be decontaminated using a water solution of TSP, then rinsed in tap water and final-rinsed in distilled water. All contaminated site equipment will be decontaminated both before and after site activities. All uncontaminated site equipment should be wiped with a wet towel at the close of site activities to remove dust.

Decontamination materials will be containerized labeled and left on-site pending appropriate characterization of the materials.

The following decontamination equipment and supplies will be used during the drilling program:

- TSP
- Steam Cleaner
- Distilled Water
- Scrub Brushes
- Towels
- Plastic Buckets
- 55-Gallon DOT-17 drums

10.0 EMERGENCY RESPONSE PLAN

The objective of this SSHP is to minimize chemical or physical hazards and operational incidents. The following directions are provided to ensure that personnel respond to emergency situations in a calm reasonable manner.

- Prior to commencement of field operations, an emergency medical assistance network will be established. The hospital, fire department, ambulance, and emergency room are identified in the list of emergency phone numbers at the beginning of this document. A vehicle will be available on-site during all activities to transport injured personnel to the identified emergency medical facility. From there, an ambulance or air-rescue would be used to transport any seriously injured worker to the nearest medical facility experienced in handling this type of emergency.

- Telephone numbers and locations , including the fastest routes to the emergency room facilities, will be posted at the site.

- In no instance will fewer than two people be present at the project site during the investigation activities.

- The SSHO will be the lead person in all emergency situations.

- The SSHO will be certified to render first aid and cardiopulmonary resuscitation (CPR) prior to initiation of field activities. A first aid kit will be available at the work site, as well as an adequate supply of fresh water and emergency eye wash.

- Site personnel will be trained in emergency procedures during the personnel training sessions described previously.

- Evacuation routes from the sampling area will be established by the SSHO and communicated to all personnel during the initial safety conference conducted before field work begins.

- The SSHO will be responsible for assuring that all personnel understand the specific emergency signals and procedures.

- In the event of an unexpected continuous vapor release, fire, or explosion, all site work will cease and the exclusion zone will be evacuated. The SSHO will notify the client contact and Tetra Tech's Project Manager, both of whom will be relied upon to determine the appropriate action.

Emergency signals

The following communication signals will be utilized, if necessary, in case of emergency on-site.

Gesture		Message
Hand clutching throat	-	Out of air/can't breathe
Hands on top of head	-	Need assistance
Thumbs up	-	OK/I'm all right/I understand
Thumbs down	-	No/negative
Grip partner's wrists	-	Informing partner to leave area immediately

Emergency Decontamination

In an emergency, the primary concern is to prevent the loss of life or severe injury to site personnel. If immediate medical treatment is required to save a life, decontamination should be delayed until the victim is stabilized. If decontamination can be performed without interfering with essential life-saving techniques or first aid, or if a worker has been contaminated with an extremely toxic or corrosive material that could cause severe injury or loss of life, decontamination must be performed immediately. If an emergency due to heat-related illness develops, protective clothing should be removed from the victim as soon as possible to reduce heat injury. All emergency decontamination procedures must be supervised by the Site Safety Officer and the Project Manager.

11.0 GENERAL SAFE WORK PRACTICES

Tetra Tech, Inc. is responsible for the safety of all Tetra Tech employees on-site. Subcontractors are responsible to provide the required training and equipment to subcontractor employees. Each contractor shall provide all the equipment necessary to meet safe operating practices and procedures for their personnel on-site (this includes respirators, cartridges, steel toed boots, eye protection, tyvek suits, hearing protectors, and neoprene latex, and viton gloves) and be responsible for the safety of their workers. All general safety guidelines and procedures will conform to:

- CCR Title 8 Section 5192
- 29 CFR 1910.120.
- Standard Operating Safety Guidelines (U.S. E.P.A., November 1984).

Tetra Tech will update versions of these safety guidelines and procedures if changes in the Operations Plan occur.

Tetra Tech will utilize a "three warning" system to enforce compliance with Health and Safety procedures as follows:

⇒ First infraction - violator receives a verbal warning.
⇒ Second infraction of same rule - violator receives a written warning.
⇒ Third infraction of same rule - violator will be requested to leave the site.

The "three warning" system applies to the following safe work practices which will be implemented at the site for worker safety:

- Eating, drinking, chewing gum or tobacco, and smoking will be allowed only in designated areas.
- Wash facilities will be utilized by workers in the work areas before eating, drinking, or use of the toilet facilities.
- All excavation/drilling work will comply with Title 8, Article G of the California Administrative Code.
- Personnel at the site will use the "buddy system" when wearing any respiratory protective equipment. No one will be allowed to engage in drilling or sampling operations alone.
- No facial hair which interferes with a satisfactory fit of the mask-to-face seal will be allowed. (no beards, large mustaches, or long sideburns).

- All respiratory protection selection, use, and maintenance will meet the requirements of established procedures, recognized consensus standards (AIHA, ANSI, MSHA, and NIOSH), and will comply in all respects to the requirements set forth in 29 CFR 1910.134.

- All site personnel will be required to wear hard hats, protective glasses and adequate hand protection when in the work zone.

12.0 REFERENCES

California Site Mitigation Decision Tree. California Department of Health Services, Toxic Substances Control Division, Alternative Technology Policy Development Section, Sacramento, CA May 1986.

Casarett and Doull's Toxicology. Eds. Curtis Klaasen, et. al. Macmillan Co., New York, 1986.

The Merck Index, 10th ed., Ed. M. Windholz, Merck & Co., Inc. Rahway, NJ, 1983.

Attachment A

HEALTH AND SAFETY COMPLIANCE STATEMENT

I, _____, have received and read a copy of the project Health and Safety Plan for the following site: Douglas Aircraft Company's C6 Torrance Facility, Torrance, California (TC #) 9187-05.

I understand that I am required to have read the aforementioned document and have received proper training under the Occupational Safety and Health Act (29 CFR, Part 1910.120) prior to conducting site activities at the site.

_____ _____

Signature Date

Attachment B

Sampling Techniques and Quality Assurance

Sampling Techniques and Quality Assurance

Drilling

Each borehole was drilled with a three inch O.D. hollow-stem hand auger. "Undisturbed" soil samples were collected at specified intervals from the surface using a sledge-hammer sampler.

Soil Sampling

To prevent cross contamination between samples, the sampler was washed prior to each sampling using the "three bucket" system. This system involves:

1. Washing the sledge-hammer sampler in a TSP and water solution.
2. Rinsing the sampler in tap water.
3. Rinsing the sampler in distilled water.

To maintain integrity of each soil sample, the following procedures were performed. After extraction, brass liners and soil samples were:

1. Sealed in foil.
2. Capped with plastic lids.

All soil samples were stored in an ice chest pending laboratory analysis.

Sample Identification

In order to prevent misidentification, all samples were affixed with adhesive paper labels that included the following information:

1. Sample number.
2. Name of collector.
3. Date of collection.
4. Location of collection.

Chain of Custody Protocol

In order to establish the documentation necessary to trace sample possession from the time of collection, a chain of custody record was completed and accompanied every sample.

TETRA TECH, INC.
670 N ROSEMEAD BLVD
PASADENA, CALIFORNIA 91107
TELEPHONE (818)449 6400
TELEFAX (818)351 8126

CHAIN OF CUSTODY RECORD

DATE 8-25-94 PAGE 1 OF 1

CLIENT: Douglas Aircraft Company
PROJECT NAME: C6 Torrance Facility
PROJECT MANAGER: David Liu
TC #: 9187-05
SAMPLERS (SIGNATURES)

SAMPLE NO	DATE	TIME	8015M-GAS Combined	8020-BTEX	NUMBER OF CONTAINERS	OBSERVATIONS/COMMENTS
31T-B1	8-25-94	9:40	X	X	1	
31T-B2	8-25-94	9:55	X	X	1	
31T-B3	8-25-94	10:10	X	X	1	
28T-B1	8-25-94	11:10	X	X	1	bottom - center
28T-C1	8-25-94	11:25	X	X	1	SW corner
28T-C2	8-25-94	11:30	X	X	1	SE corner
28T-C3	8-25-94	11:40	X	X	1	NE corner
28T-C4	8-25-94	11:45	X	X	1	NW corner
27T-B1	8-25-94	12:20	X	X	1	
27T-B2	8-25-94	12:30	X	X	1	
27T-B3	8-25-94	12:35	X	X	1	Sidewall
27T-B4	8-25-94	12:40	X	X	1	

RELINQUISHED BY: Jill Davis	SIGNATURE: Jill Davis	TETRA TECH, INC.	DATE 8/25	TIME 4:50	12 TOTAL NUMBER OF CONTAINERS	
RECEIVED BY: Joe Andrew	SIGNATURE: Joe Andrew	COMPANY	DATE 8/25	TIME 4:50	METHOD OF SHIPMENT	
RELINQUISHED BY	SIGNATURE	COMPANY	DATE	TIME	SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS	
RECEIVED BY	SIGNATURE	COMPANY	DATE	TIME		

Attachment C

Laboratory Analytical Report

Applied P & Ch Laboratory
4006 E. Mission Blvd., Pomona, CA 91766
Tel: (909) 622-5145 Fax: (909) 622-5199

APCL Analytical Report

Submitted to:
Tetra Tech (Pasadena)
Attention: Dr. David Liu
670 N. Rosemead Blvd.
Pasadena, CA 91107
Tel: (818)449-6400 Fax: (818)351-8126

Service ID #: 801-943762
Collected by:
Collected on: 08/25/94
Sample description:
Soil from Douglas Aircraft Company
Project: C6 Torrance Facility, TC#9187-05

Received : 08/25/94
Tested : 08/29-30/94
Reported : 09/02/94

Analysis of Soil

801-943762 Page 1 of 1

Component Analysed	Method	Unit	PQL	Concentration					
				27T-B1	27T-B2	27T-B3	27T-B4	28T-B1	28T-C1
				94-3762-1	94-3762-2	94-3762-3	94-3762-4	94-3762-5	94-3762-6
TPH: Gasoline + BTXE Distinction									
TPH (Gasoline)	M8015	mg/kg	1	N.D	N.D.	N.D.	N D	N D	N.D.
Benzene	8020	µg/kg	5	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Ethylbenzene	8020	µg/kg	5	N.D.	N.D.	N.D	N.D	N.D.	N.D.
Toluene	8020	µg/kg	5	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
o-Xylene	8020	µg/kg	5	N D	N.D.	N.D.	N.D.	N D	N.D.
m-Xylene/p-xylene	8020	µg/kg	5	N.D.	N D	N.D.	N D.	N.D.	N.D
BTXE, Total	8020	µg/kg	5	N.D.	N.D.	N.D.	N D.	N D	N.D.

Component Analyzed	Method	Unit	PQL	28T-C2	28T-C3	28T-C4	31T-B1	31T-B2	31T-B3
				94-3762-7	94-3762-8	94-3762-9	94-3762-10	94-3762-11	94-3762-12
TPH: Gasoline + BTXE Distinction									
TPH (Gasoline)	M8015	mg/kg	1	N.D.	N.D.	N.D.	N D	N.D	N.D.
Benzene	8020	µg/kg	5	N D.	N.D.	N.D.	N.D.	N D	N.D.
Ethylbenzene	8020	µg/kg	5	N.D.	N D	N D	N.D.	N.D.	N.D.
Toluene	8020	µg/kg	5	N D.	N.D.	N.D.	N D	N.D.	N.D.
o-Xylene	8020	µg/kg	5	N.D.	N.D	N.D.	N.D.	N.D.	N.D.
m-Xylene/p-xylene	8020	µg/kg	5	N.D.	N.D.	N D.	N.D	N.D	N D.
BTXE, Total	8020	µg/kg	5	N.D.	N.D.	N.D.	N.D	N D.	N D

PQL : Practical Quantitation Limit
N.D. : Not Detected or less than the quantitation limit.

Respectfully submitted,

Jack Y. Zhang, Ph. D.,
Director
Applied P & Ch Laboratory

CADHS ELAP CERTIFICATION NUMBER 1431